

WHAT IS CLAIMED IS:

- 1 1. An apparatus comprising:
2 a vacuum chamber containing a particle detecting
3 integrated circuit, the particle detecting integrated
4 circuit including a device having a pair of exposed
5 conductive lines spaced at a critical pitch corresponding
6 to particles of interest.
- 1 2. The apparatus of claim 1 further comprising a computer
2 system linked to the particle detecting integrated circuit.
- 1 3. The apparatus of claim 1 wherein the particle detecting
2 integrated circuit includes a remote-controlled movable
3 cover protecting the device.
- 1 4. The apparatus of claim 1 wherein the particle detecting
2 integrated circuit includes a plurality of devices.
- 1 5. The apparatus of claim 4 wherein the plurality of
2 devices include a uniform pitch representing a single
3 particle size between pairs.
- 1 6. The apparatus of claim 4 wherein the plurality of
2 devices include a plurality of pitches representing a range
3 of particle sizes between pairs.
- 1 7. The apparatus of claim 2 wherein the computer system
2 detects a change in current when a metallic particle shorts
3 the pair of exposed conductive lines.
- 1 8. The apparatus of claim 2 wherein the computer system
2 detects a change in capacitance when a non-metallic
3 particles lodges on or between the pair of exposed
4 conductive lines.

1 9. An apparatus comprising:

2 a mask stage in a vacuum chamber of semiconductor
3 processing equipment;

4 a particle detecting integrated circuit embedded in
5 the mask stage, the particle detecting integrated circuit
6 containing a device having a pair of conductive lines
7 exposed to a local vacuum environment, the pair of lines
8 spaced at a critical pitch corresponding to particles of
9 interest.

1 10. The apparatus of claim 9 further comprising a computer
2 system linked to the particle detecting integrated circuit.

1 11. The apparatus of claim 10 wherein the pair of
2 conductive lines have an applied voltage.

1 12. The apparatus of claim 11 wherein the computer system
2 detects a change in current when a metallic particle shorts
3 the pair of conductive lines.

1 13. The apparatus of claim 11 wherein the computer system
2 detects a change in capacitance when a non-metallic
3 particle lodges on or between the pair of conductive lines
4 of the particle detecting integrated circuit.

1 14. The apparatus of claim 10 wherein the computer system
2 is semiconductor component circuitry.

1 15. The apparatus of claim 10 wherein the computer system
2 is off-chip circuitry.

1 16. The apparatus of claim 9 wherein the particle detecting
2 integrated circuit comprises a plurality of devices.

1 17. The apparatus of claim 16 wherein each of the plurality
2 of devices includes pairs of conductive lines having a
3 uniform pitch representing a single particle size.

1 18. The apparatus of claim 16 wherein each of the plurality
2 of devices includes pairs of conductive lines having a non-
3 uniform pitch representing a range of particle sizes.

1 19. A method comprising:

2 exposing a particle detecting integrated circuit to
3 residual gases and particles within a vacuum environment,
4 the particle detecting integrated circuit containing a
5 device having a pair of conductive lines spaced at a
6 critical pitch corresponding to particles of interest;

7 applying a voltage to the pair of conductive lines;
8 and

9 detecting a change in an electrical property of the
10 conductive lines resulting from a particle landing on or
11 between the pair of conductive lines.

1 20. The method of claim 19 wherein detecting comprises a
2 change in current between the pair of conductive lines.

1 21. The method of claim 19 wherein detecting comprises a
2 change in a capacitance between the pair of conductive
3 lines.

1 22. The method of claim 19 further comprising exposing a
2 plurality of devices to the residual gases and particles
3 within the vacuum environment, each one of the devices
4 having a pair of conductive lines spaced at a critical
5 pitch corresponding to particles of interest.

1 23. The method of claim 22 wherein the critical pitch
2 corresponds to a range of particles of interest.

1 24. A chip fabrication method comprising:

2 a photolithography process including a real-time
3 particle detection process, the real-time particle
4 detection process comprising:

5 exposing a particle detecting
6 integrated circuit embedded in a stage to
7 residual gases and particles within a vacuum
8 environment, the particle detecting
9 integrated circuit containing a device
10 having a pair of conductive lines spaced at
11 a critical pitch corresponding to particles
12 of interest;

13 applying a voltage to the pair of
14 conductive lines;

15 detecting a change in an electrical
16 property of the conductive lines resulting
17 from a particle landing on or between the
18 pair of conductive lines;

19 an etching process;

20 a stripping process;

21 a diffusion process;

22 an ion implantation process;

23 a deposition process; and

24 a chemical mechanical planarization process.

1 25. The method of claim 24 wherein detecting a change
2 comprises a change in current between the pair of
3 conductive lines.

1 26. The method of claim 24 wherein detecting a change
2 comprises a change in a capacitance between the pair of
3 conductive lines.

1 27. The method of claim 24 wherein exposing further
2 comprises exposing a plurality of devices to the residual
3 gases and particles within the vacuum environment, each of
4 the devices containing a pair of conductive lines spaced at
5 a critical pitch corresponding to particles of interest.

1 28. The method of claim 27 further comprising:
2 applying a voltage to the conductive lines of the
3 plurality of devices; and
4 detecting changes in electrical properties of the
5 pairs of conductive lines resulting from particles landing
6 on or between the pairs of conductive lines.

1 29. The method of claim 28 wherein critical pitches of the
2 conductive lines of the devices correspond to a range of
3 particles of interest.